

Human impacts – air pollution

Industrialisation – since the beginning of the 19th century

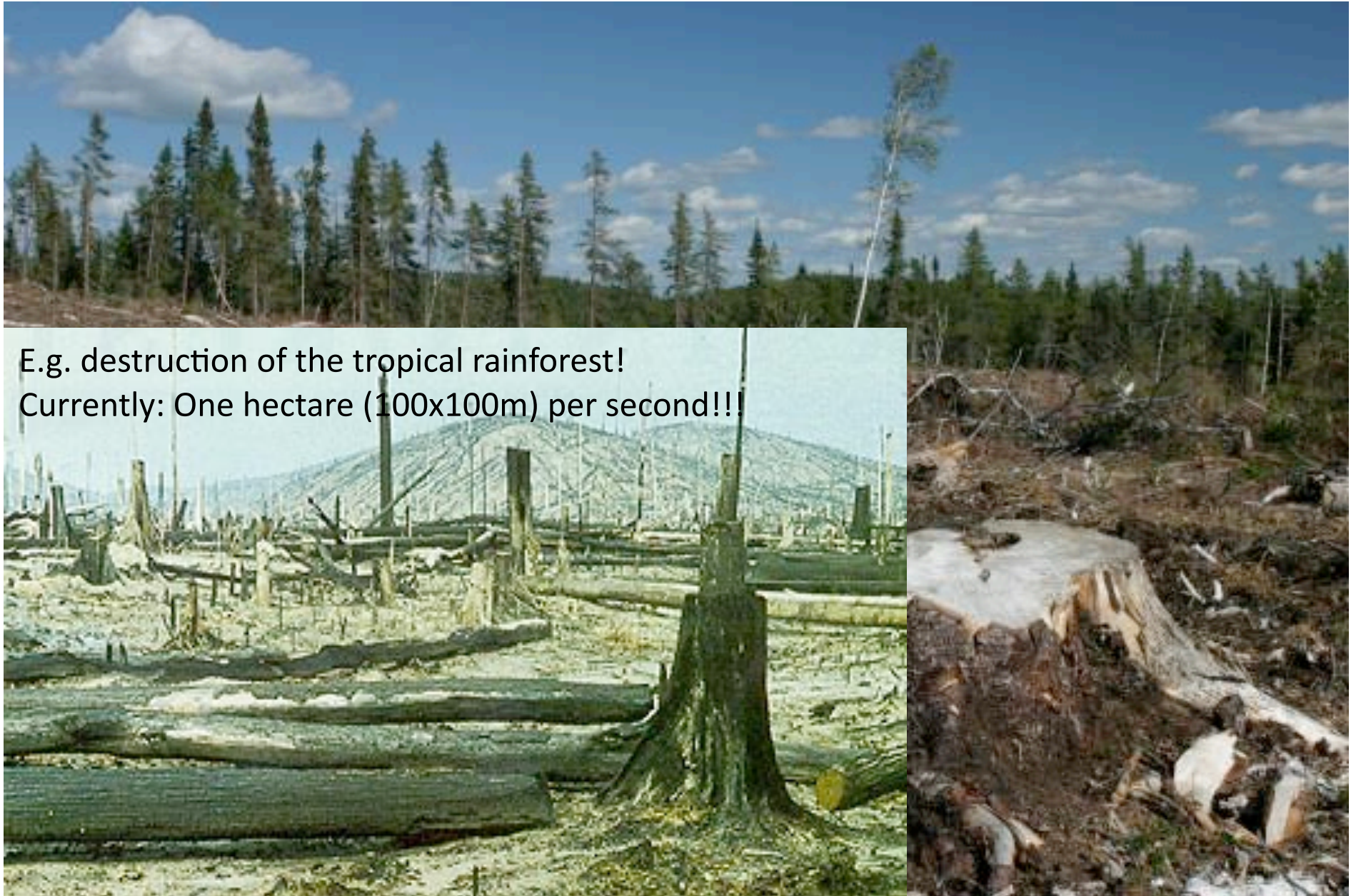


Human impacts – agriculture

E.g. large monocultures!



Human impacts – deforestation



E.g. destruction of the tropical rainforest!
Currently: One hectare (100x100m) per second!!!

Human impacts – oil spills

Deep water horizon – oil spill in 2010



Human impacts – radioactivity

Chernobyl (Ukraine) 1986



Fukushima (Japan) 2011



Human impacts – GMOs (genetically modified organisms)



GMO crops

E.g. „golden rice“ with additional Vitamin A – against malnutrition in 3rd world countries!

... concerns

What happens, if GMO crops mix with naturally occurring plants? Can genes “hop” to other plant species?



GMO cat

Introduced genes:

GFP = green fluorescent protein
from a jellyfish

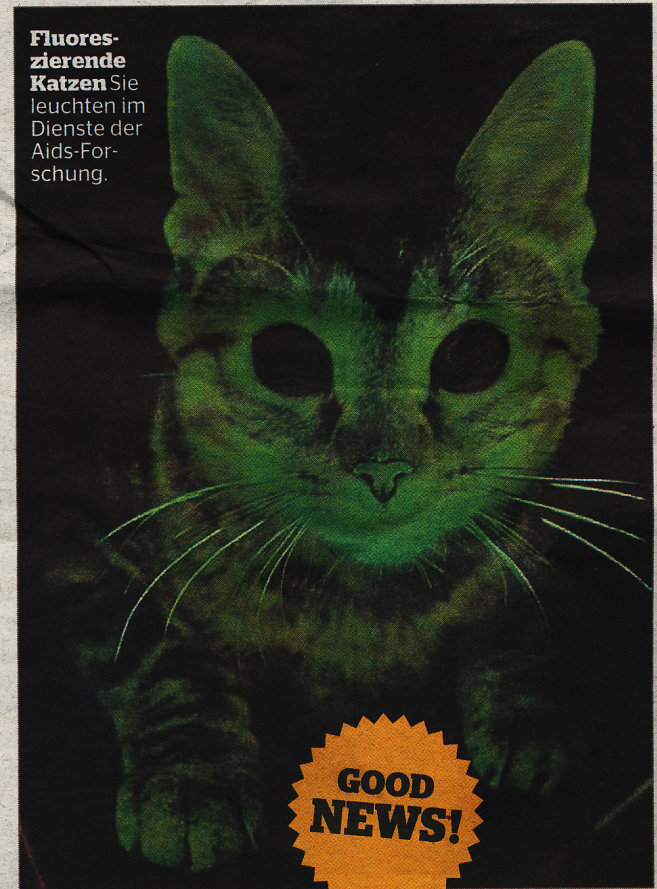
Monkey genes that make
the cat resistant against
“cat AIDS” (FIV).
(feline immune-deficiency virus)

Erfolg gegen Aids

EXPERIMENT ➔ Forschern ist es gelungen, Katzen zu züchten, deren Zellen resistent gegen Aids sind.

Diese grün leuchtende Katze könnte der Durchbruch im Kampf gegen Aids sein. Denn sie hat nicht nur eine spezielle Färbung, sondern ist auch gegen FIV, das sogenannte Katzen-Aids, resistent. Forscher der Mayo Clinic im US-Bundesstaat Minnesota haben das Tier gezüchtet. Die Wissenschaftler implantierten Affengene, die das Virus blockieren sollen, in die Eizellen der Katzen. Um die modifizierten Zellen von den normalen unterscheiden zu können, fügten die Forscher auch das Gen einer Qualle ein. Das Experiment war erfolgreich: Die Zellen der grün leuchtenden Katze sind gegen das Virus resistent. Laut dem Forschungsleiter Dr. Eric Poeschla ist dieses Resultat eine wichtige Grundlage für die Forschung gegen Aids beim Menschen.

Fluoreszierende Katzen Sie leuchten im Dienste der Aids-Forschung.



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Human impacts – invasive species!



Human impacts – Consequences?

What happens to the **biodiversity** of natural ecosystems because of human impacts???

Biodiversity gets **reduced**!

Air pollution/ oil spills/ radioactivity

→ Species that cannot tolerate pollution/ oil/ radioactivity will die!

→ Only tolerant species survive

Agriculture/ deforestation

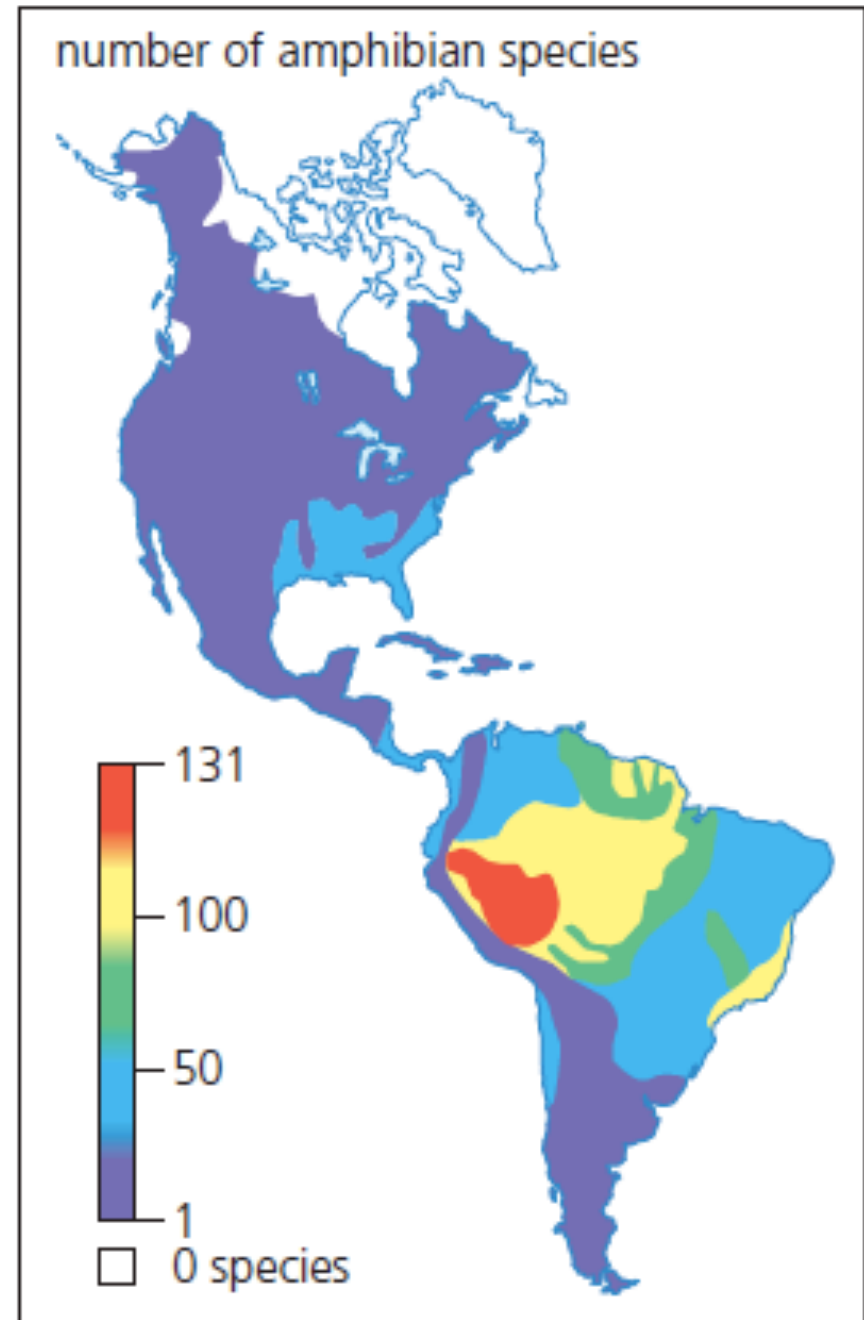
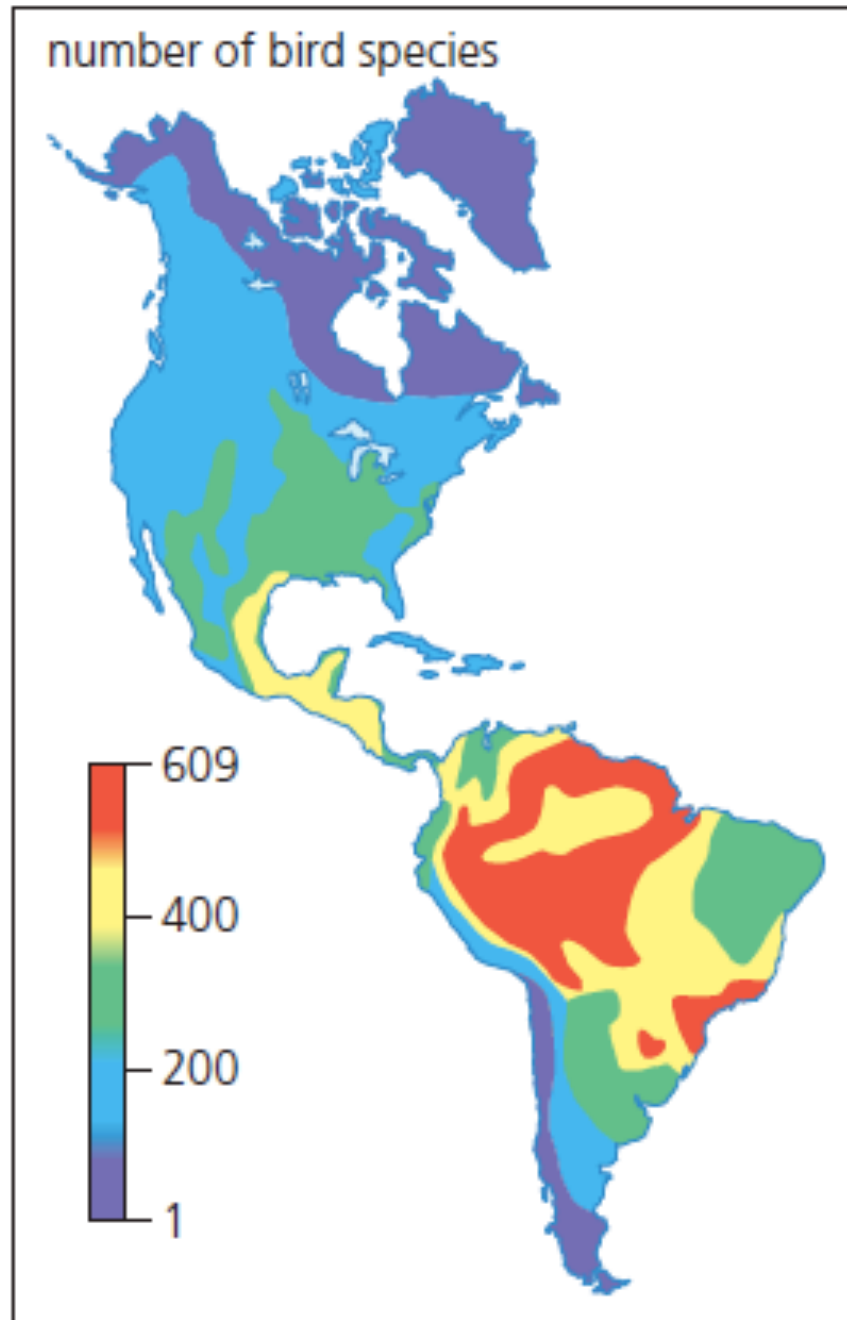
The high biodiversity of forests or other natural ecosystems is destroyed!

The biodiversity of croplands (Kulturflächen) is very low!!

GMOs: What happens if GMO plants/ animals mix with naturally occurring species?

One possibility is that they have advantages over naturally occurring species and will “take over” ecosystems, thereby reducing biodiversity!

The tropical rainforest – the highest species diversity on Earth!



Alien species – examples

Kudzu (*Pueraria lobata*) – see book p. 575/ 576

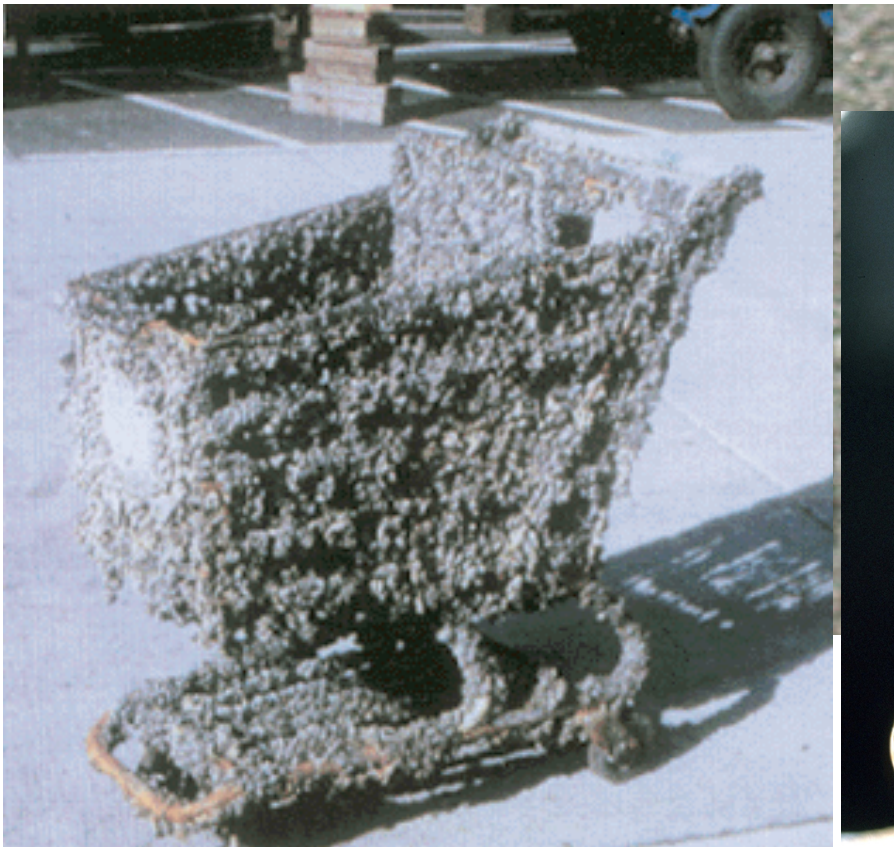
- Invasive vine (Kletterpflanze) in the southern US
- Grows very fast and overgrows everything – even cars and houses!
- Originates from Japan and was introduced to the US at the end of the 19th century.



Alien species – examples

Zebra mussels (*Dreissena polymorpha*) – see book p. 576

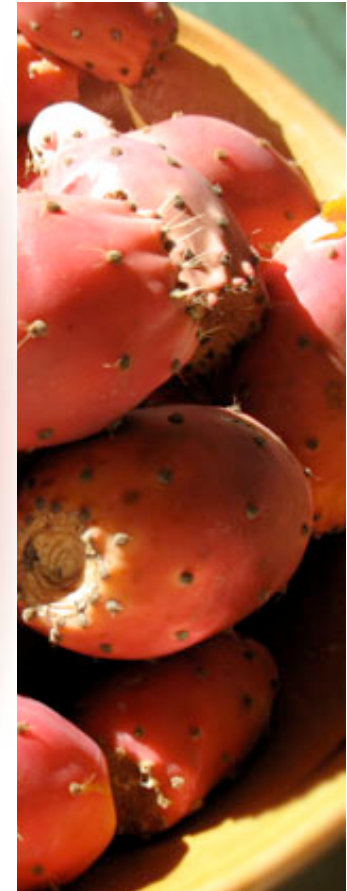
- Invasive freshwater (Süßwasser) molluscs in the northern US
- Introduced to the US by accident through European ships (1980s)
- Zebra mussels block water pipes.



Alien species – examples

Prickly pear (*Opuntia stricta*) – see book p. 577

- Invasive cactus species in Australia – introduced by Europeans and Americans in the 19th century
- The cactus produces flowers and edible “cactus figs” that are also used to produce liquor (e.g. in Malta)



Alien species – examples

Prickly pear (*Opuntia stricta*) – see book p. 577

- Invasive cactus species in Australia – introduced by Europeans and Americans in the 19th century
- Today, the prickly pear population in Australia is under control!
→ Since a **cactus eating moth** (*Cactoblastis cactorum*) was introduced to Australia, the two populations balance each other out!



Alien species – examples

The rabbits in Australia – remember chapter 5.3 Populations!

Rabbits were brought to Australia in the 19th century!

There had no natural enemies there, thus they multiplied exponentially!

→ Destruction of crops, erosion of the soil, danger to local ecosystems!

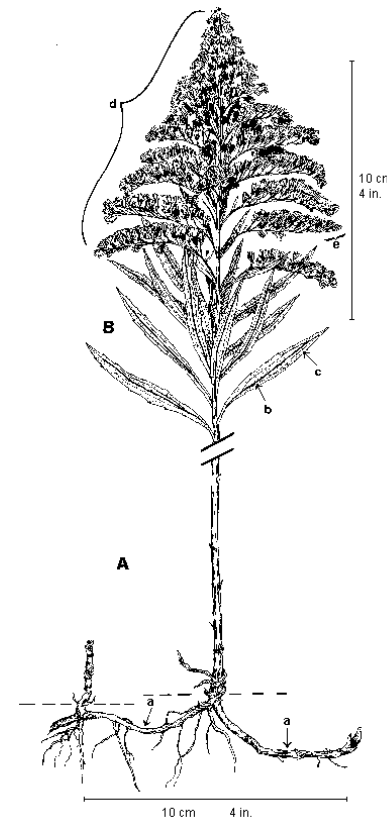
→ Rabbits are controlled through shooting (ineffective), poisoning, rabbit pathogens



Alien species – Swiss example

Goldenrod (Goldrute; *Solidago canadensis*)

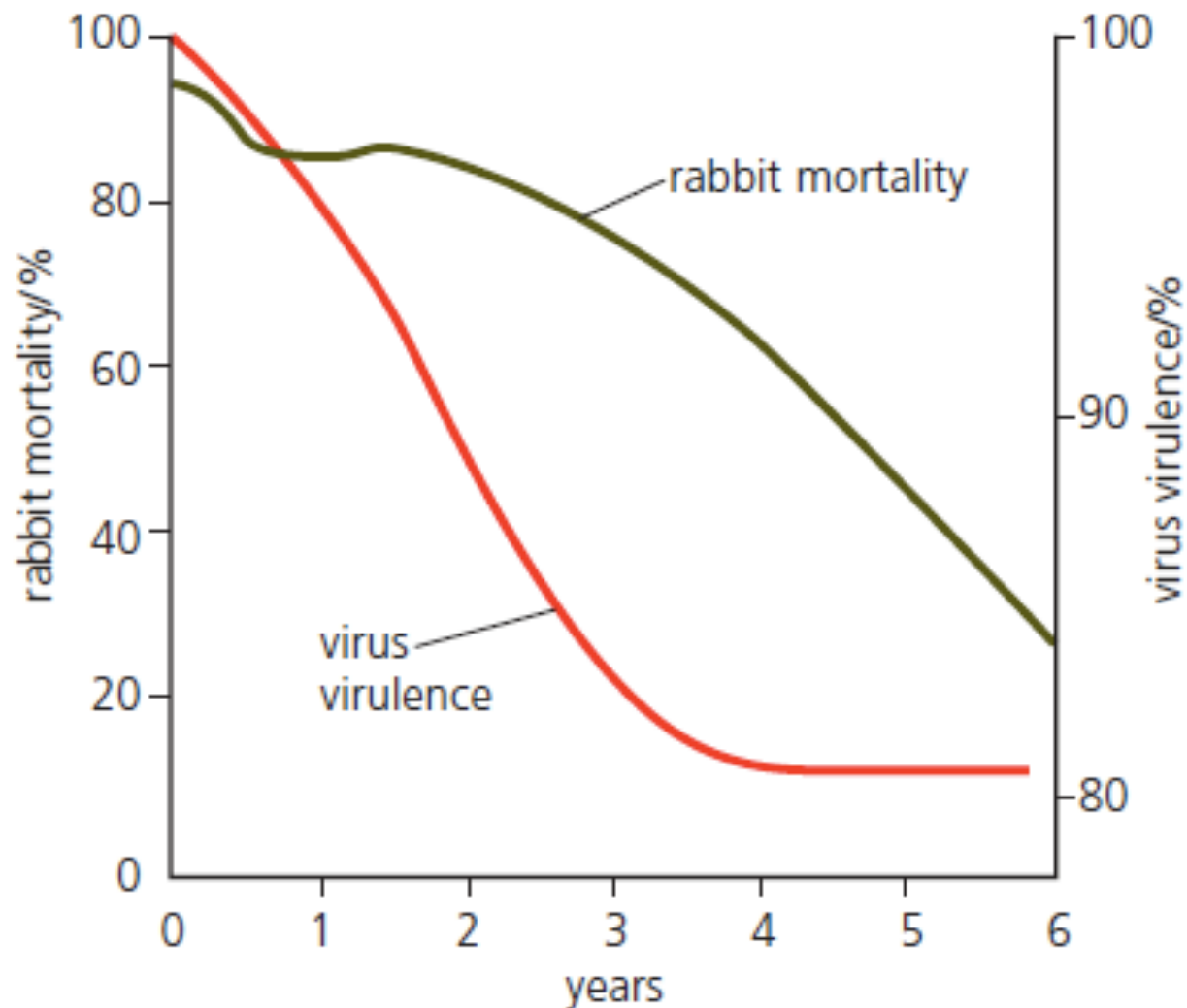
- The goldenrod has been introduced to Europe as a **garden plant** around 250 years ago.
- It originates from **Canada and North America**.
- The goldenrod has a **strong rhizome**. It will grow back, if it is cut. Pulling the plant out of the soil is a more effective strategy to get rid of it ☺



Alien species – examples

The rabbits in Australia – remember chapter 5.3 Populations!

In the 1950ies a rabbit pathogen called Myxoma virus was introduced in order to control the rabbit population in Australia.



Can you find an explanation for this?

Evolution!

Through mutations, some rabbits become resistant.

→ The sensitive rabbits die

→ The resistant rabbits reproduce

→ Over time a greater proportion of the rabbit population becomes resistant, because they inherit the resistance gene(s)

Alien species – another Swiss example

Red swamp crayfish (*Procambarus clarkii*; roter amerikanischer Sumpfkrebs)

- Freshwater (Süßwasser) crayfish that originates from north America.
- Threat to local crayfish!
 1. Competition
 2. *Procambarus* is a carrier of the crayfish plague (Krebspest). *Procambarus* is only mildly affected by the disease but European crayfish die because of it!



Skin examination checklist



Asymmetry

A

If you draw a line through this mole, the two halves will not match, meaning it is asymmetrical, a warning sign for melanoma.



Border

B

The borders of an early melanoma tend to be uneven. The edges may be scalloped or notched.



Color

C

Having a variety of colors is another warning signal. A number of different shades of brown, tan or black could appear. A melanoma may also become red, white or blue.



Diameter

D

Melanomas usually are larger in diameter than the size of the eraser on your pencil (1/4 inch or 6 mm), but they may sometimes be smaller when first detected.



Evolving

E

When a mole is evolving, see a doctor. Any change — in size, shape, color, elevation, or another trait, or any new symptom such as bleeding, itching or crusting — points to danger.

Links

Definitions of biodiversity

http://biodiversity.ca.gov/Biodiversity/biodiv_def2.html

Swiss website about biodiversity (German)

<http://www.biodiversity.ch/>

Website about invasive plants and animals in Switzerland (German)

<http://www.neophyt.ch/> (plants)

<http://www.neozoen.ch/> (animal)

Brochure about biodiversity and invasive species (German)

http://www.biodiversity.ch/downloads/5_02_d.pdf

Fire ants vs. phorid flies – slightly exaggerated 😊

<http://www.youtube.com/watch?v=6UThaL-D6U8>

The ozone hole

<http://www.youtube.com/watch?v=qUfVMogldr8>

http://www.youtube.com/watch?v=k2kpz_8ntJY